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May 22, 2002

Mr. Johnny Reising
U.S. Department of Energy, Fernald Area Office
P.O. Box 538705
Cincinnati, OH 45253-8705

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RE: COMMENTS ON PSP FOR URANIUM PARTITIONING OF GMA SEDIMENTS

Dear Mr. Reising:

This letter provides as an attachment Ohio Environmental Protection Agency comments on the Project Specific Plan for the Analysis of Uranium Sorption and Partitioning on Great Miami Aquifer Matrix Sediments.

Should you have any questions, please contact Tom Ontko or me.

Sincerely,

for Thomas A. Schneider
Fernald Project Manager
Office of Federal Facilities Oversight

cc: Jim Saric, U.S. EPA
Terry Hagen, Fluor Fernald
Mark Shupe, GeoTrans, Inc.
Mary Wojceichowski, Tetra Tech EM Inc.
Ruth Vandergrift, ODH

Attachment

Q:\ou5\groundwater\sorption&partition.wpd

- 1) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 1.0 Pg.#: 1 Line #: 26 Code: C
Comment: The last paragraph states that Kd is related to the kinetic terms α_c and α_d . This statement assumes that a linear sorption model is the appropriate model for relating soil and water concentrations. The PSP will help provide information on whether this is a valid assumption, but the validity of a linear sorption model should not be assumed before the study is completed. Previous reports have discussed differences in Kd under sorption and desorption conditions, suggesting that linear sorption concepts are not valid. We believe that data from the study will help in understanding the controls on uranium transport, but it is premature to conclude that a kinetic sorption/desorption approach will work. Further, this study does not provide any information on the kinetics of the reactions.
- 2) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 4 Line #: 15 Code: C
Comment: The use of archived samples for this study may produce results that are not consistent with newly collected samples. If the uranium is associated with iron oxyhydroxides, then aging and crystallization of the oxyhydroxides may impact the results. We have not performed any literature review to determine whether drying of samples affects the crystallinity of the oxyhydroxides, assuming that the archived samples have been allowed to dry. On the other hand, if the samples are still moist, what is the effect of possible microbial growth? These questions should be evaluated with respect to use of the archived samples.
- 3) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 4 Line #: 18 Code: C
Comment: The four locations are associated with uranium plumes. If background concentrations are high enough to provide measurable concentrations in the extracts, collection of samples from background areas should be considered.
- 4) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.3 Pg.#: 5 Line #: 13 Code: C
Comment: Rinsing of the sieves, followed by drying with air, would further reduce the likelihood of cross contamination.
- 5) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.5 Pg.#: 6 Line #: 4 Code: C
Comment: Alternate methods for performing the sequential extractions are provided by Schultz and others (1998a, 1998b). We have not reviewed these reports, but they may provide more selective extraction, given their more recent development.
- 6) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.5 Pg.#: 6 Line #: 4 Code: C

7) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.5 Pg. #: 6 Line #: 13 Code: C
Comment: The effects of changes in pH during steps 1 and 2 should be considered. The ZPC's of possible sorbents are close to 7, so that inadvertent pH excursions may cause desorption. How will the pH be controlled? Would a prior step in which the pH were increased to above the ZPC of iron oxyhydroxide be useful? Given that nitric acid was used as part of the uranium processing, would $MgCl_2$ (Schultz and others, 1999) be a better choice for step 1?

8) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.5 Pg. #: 6 Line #: 18 Code: C
Comment: Step 3 proposes to use acetic acid (Table 1 says NaOAc with acetic acid) to dissolve the carbonate minerals. According to Schultz and others (1999, p. 184), Tessier and others (1979) found that "the dissolution of amorphous and easily dissolved (poorly crystalline) metal oxides/oxyhydroxides may also occur during this reaction (specifically adsorbed metals may also be extracted during this reaction step)." Schultz and others recommend using NH_4Ac rather than NaAc.

9) Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.5 Pg. #: 6 Line #: 26 Code: C
Comment: Step 5 -- Schultz and others (1999) found that several additions of H_2O_2 were necessary to complete the extraction of the organic material.

Schultz, M.K., Biegalski, S.R., Inn, K.G.W., Yu, L., Burnett, W.C., Thomas, J.L.W., and Smith, G. E., 1999. Optimizing the removal of carbon phases in soils and sediments for sequential chemical extractions by coulometry. J. Environ. Monit., v. 1, p. 183-190.

Schultz, M.K., Inn, K.G.W., Lin, Z.C., Burnett, W.C., Smith, G.E., Biegalski, S.R., and Filliben, J. 1998a, Appl. Radioat. Isot., v. 49, p. 1289.

Schultz, J.K., Burnett, W.C., and Inn, K.G.W. 1998b. J. Environ. Radioact., v. 40, p. 155.

Tessier, A., Campbell, P., and Bisson, 1979. Anal. Chem., v. 51, p. 844.